ture were found in both the lymphatic glands and the bone-marrow.

The blood of a dog which has undergone splenotomy, when transfused into the vessels of another dog, causes in the lymph-glands and bone-marrow phenomena similar to those above described. The author thinks they are in the main due to increased extravasation (? *diapedesis*) of red blood corpuscles.

H. NEWELL MARTIN.

THE CACHAR EARTHQUAKE OF 1869.

THE Geological survey of India publishes in vol. xix., part i., of its memoirs (1882), an account and discussion of the Cachar earthquake of north-eastern India, Jan. 10, 1869. The observations were made and the study begun by the late Dr. Thomas Oldham, then superintendent of the Survey: the work is lately completed by his son, R. D. Oldham, now a member of the geological corps The memoir gives a general account of the shock and its destructive effects; notices of previous descriptions by Oldham, sen., Godwin-Austen, H. F. Blanford, and Archdeacon Pratt, which in the present view seem largely erroneous in their theoretical parts; and a discussion of the position, depth, and shape of the seismic area, and the velocity of the earth-wave's motion and translation. It is well illustrated by photographs, lithographs, diagrams, and maps.

Cachar (or Silchar), where the shock produced great destruction, and after which it was named, is a town on the Barak river, at the southern base of the rainy Jaintia hills, about 300 miles north-east of Calcutta. The seismic vertical was some 80 miles farther north, as determined by thirty-six intersections falling within an area forty miles by four or five; or, excluding the less satisfactory lines, on an area twenty miles by three or four. The depth of the focus is estimated from several tolerably accurate observations at two stations, at thirty miles — or somewhere between twenty-five and thirty-five miles — below the surface. The area over which the shock was felt was an oval measuring 650 miles north-east and south-west, and 400 miles across, covering 250,000 square miles, and including Patna and Hazaribagh on the west; the Ganges delta and Chittagong on the south; the head waters of the Namtonai (branch of Irrawaddy) on the east; and the southern slope of the Himalaya on the north. In the latter direction, the extension of the shock was not determined. Within this, a smaller oval or isoseismal line is drawn to show the region of great destruction; this is symmetrically placed around the seismic centre. The velocity of wave-translations, estimated over a difference of seismic radii of 180 miles,[1] was 1.2 miles a second, which is regarded as very high and improbable, although the observations on which it is based — chronometer time noted by Major Godwin-Austen in the hills forty miles north-east of Cachar, and the clocks stopped by the shock in the surveyor-general's office in Calcutta — seem trustworthy. The wave-motion, even at a distance of eighty-five miles from the seismic vertical, was thirty feet a second; decidedly greater than that found by Mallet for the Neapolitan earthquake of 1857. The large value of the angle of emergence at Cachar is ingeniously accounted for as a result of upward refraction of the wave in passing through the loose alluvial sands. In spite of the violence of the shock, few lives were lost, and few buildings overthrown: the reason being that most of the houses are of wood and bamboo, elastic enough to escape great injury; or, if of masonry or brickwork, the walls are heavy and low, supporting each other against overthrow. A church-tower, a saw-mill, and a two-storied palace were thrown down. A secondary action of the shock produced greater destruction at certain points. The alluvial deposits along the river-bottoms sometimes contain strata of soft, water-logged quicksand; and where the heavy clays overlying these are cut through by the streams, they are often cracked parallel to the steep bank by the earth-wave, and then settle down, and slide on the soft sands beneath. If this happen in a village, the buildings are torn to pieces by the differential motion of their foundations, even if able to escape the effect of the shock. Connected with this effect is the formation of 'sand-craters,' which are shown to result from the wet quicksand being forced up through a vent or crevice opened in the overlying clays; the open cup-like form being produced by the back-flow of the water after the shock passes on. These are finely illustrated, and at once recall the figures given in Lyell's 'Principles' of the 'circular hollows' formed on the Calabrian plains by the earthquake of 1783.

The memoir closes with an appendix giving simple instructions for earthquake observations, and we cordially join the author in the hope that such observations may soon be undertaken at the meteorological stations throughout the earthquake districts of India.

W. M. DAVIS.

[1] There seems to be an error of 100 miles in the distance of Calcutta from the seismic vertical given on p. 84. Correcting this, there would be a difference of 280 miles between the two seismic radii in question, and the velocity of wave-translation would rise to about two miles a second, — even more excessive than is given in the text.

LETTERS TO THE EDITOR.

[*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*]

A class-room experiment.

The class experiment commonly employed for demonstrating chemical decomposition consists in heating mercuric oxide, and showing that oxygen is given off while mercury remains behind. An easier and equally beautiful experiment may be performed with crystallized copper formate. This salt, when heated over a gas-flame in a dry test-tube, readily decomposes; oxides of carbon are evolved, and a brilliant residue of metallic copper is left. The formate is easily prepared by boiling copper oxide with formic acid, and filtering. On cooling, fine blue crystals are deposited. Although this experiment involves no new facts, I believe its applicability to class-room purposes has been generally overlooked.

F. W. CLARKE.

Domestic ducks that fly abroad like pigeons.

Facts relating to the history of the domestication of animals are so rare that it is highly important to keep them in view when once they are presented. In this category may be placed O'Donovan's account of the domestic ducks of the Caspian Turcomans. He noticed, especially in the villages bordering upon the south-eastern coast of the Caspian Sea and the Atterex delta, that great flocks of ducks are reared by the inhabitants.

"But so nomadic are the habits of these birds, and so strong are they upon the wing, that it is all but impossible to distinguish them from their wilder brethren that people these solitudes in such vast numbers. I have frequently been astonished at seeing what I took to be a crowd of fifty or sixty mallards come flying into the midst of the village, and, forming in some open space, proceed to march in serried files into the hut devoted

to them; and I have called down the wrath of the inhabitants upon my head by discharging my gun at them. They fly away for miles along the coast, keeping themselves carefully separated from the wilder sea-birds, and invariably return to their domicile at a certain hour in the evening." — (*The Merv oasis*, i. 159.)

Can any of your readers state to what species of duck reference is here made? and are any similar facts regarding domesticated or semi-domesticated ducks on record? F. H. STORER.

POOLE'S NEW INDEX.

An index to periodical literature. By William Frederick Poole, LL D. 3d edition, brought down to January, 1882, with the assistance, as associate editor, of William I. Fletcher, and the co-operation of the American library association and the Library association of the United Kingdom. Boston: J. R. Osgood & Co., 1882. 1442 p. Large 8vo.

THE appearance of a new edition of Poole's Index to periodical literature is not only an event of literary importance, but a matter of some moment to science as well. In recent times, literature and science have grown so close together that the student of one cannot well ignore the other; and a glance at the work before us will show how impossible it is to draw between them any sharp dividing-line. Of course it was not the purpose of the editor to index the periodicals of a purely technical kind; but popular science seems to have been included in his plan. Accordingly we find such journals as Silliman's, Nature, the American naturalist, the Popular science monthly, the Anthropological review, the Journal of the Franklin institute, the Mathematical monthly, Van Nostrand's engineering magazine, the Edinburgh philosophical journal, etc., exhaustively treated. Others of equal importance are omitted; but enough are included to make the volume one of real value to every worker in science, whether he be mathematician, astronomer, physicist, chemist, naturalist, geologist, or engineer. The sins of omission count for nothing when balanced against the solid merits of the enterprise. The arrangement of the work is entirely by topics; and its extensiveness may be illustrated by the fact, that between the titles 'electric animals' and 'electrotype,' there are over two hundred and fifty distinct headings, and a large number of sub-entries besides. Many of the titles represent work by the most eminent electricians of the century.

To the student of science the volume, apart from its references to scientific journals, has two points of special interest. First, it contains what is wholly wanting in catalogues of scientific memoirs; namely, abundant material concerning the personality of scientific men. If one wishes to study the life and influence of Faraday, Humboldt, Agassiz, or Henry, here he will find references to a multitude of papers; such as biographical notices, obituaries, criticisms, sketches, and so on. In nearly every magazine, whether monthly or quarterly, matter of this kind is to be found; and Poole's Index gives us a systematic key to the entire mass of it. The saving of time to the student can hardly be estimated, and the value of the material thus rendered available is by no means small. Whatever great work a master in science may have done, we can better appreciate it if we know something of himself and his environment. Whenever, in studying a mooted question, we try to assign weight to differing authorities, it is worth while to get at some knowledge as to the personal equation of the men. This is particularly true with regard to the bitterer controversies.

The second point of interest above referred to is the evidence which the Index offers as to the extraordinary influence which science exerts, even upon journals which are ostensibly quite outside of its own domain. Every one of the leading magazines is subject to this influence. We find symptoms of it in the scientific references scattered through literary, philosophical, and political essays, and in the host of papers in which science is sought to be popularized. Even poetry, which some critics assert is independent of and above science, is getting to be full of scientific allusions. Many of the popular essays upon scientific themes have solid and permanent value, and yet they are not recorded in such catalogues as that of the Royal society. Only in this volume can we get readily on the track of them; and here we find the names of Herschel, Tyndall, Huxley, Faraday, Helmholtz, Agassiz, and many others, to whom science seemed a matter of human interest, rather than a secret chamber to be entered only by the initiated. Some of the papers here cited contain the first germs of great ideas; others represent the earnest efforts of discoverers to bring their work before the wider public; still others are pleasant summaries of recent scientific advance arranged by appreciative teachers. Whatever a truly competent investigator has to say is likely to be worth hearing; and even his colleagues may gain a clearer conception of his thought by listening to his attempts at popular simplification. Mr. Poole and his associates deserve the hearty thanks of all workers in science for the service he has done their cause.